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BIOLOGICAL SURVEY

OF THE

ETOBICOKE CREEK

1962
1963
1964

ONTARIO WATER RESOURCES COMMISSION

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Biological survey of the
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BIOLOGICAL SURVEY

of the

ETOBICOKE CREEK

1962

1963

1964

by

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Biology Branch

May, 1966

BIOLOGICAL SURVEY OF THE ETOBICOKE CREEK - 1962, 1963, 1964

INTRODUCTION

The examination of biological conditions of a watercourse provides information of practical use in assessing water quality and the effect of changes in water quality. Changes in the characteristics of water which adversely affect the amenities of a watercourse are usually associated with alterations in aquatic plant and animal communities. As well, the extent to which these communities are changed indicates the degree of water quality change and reflects conditions in the watercourse over several months prior to examination. Biological data also provide a useful basis with which to compare future changes in water quality.

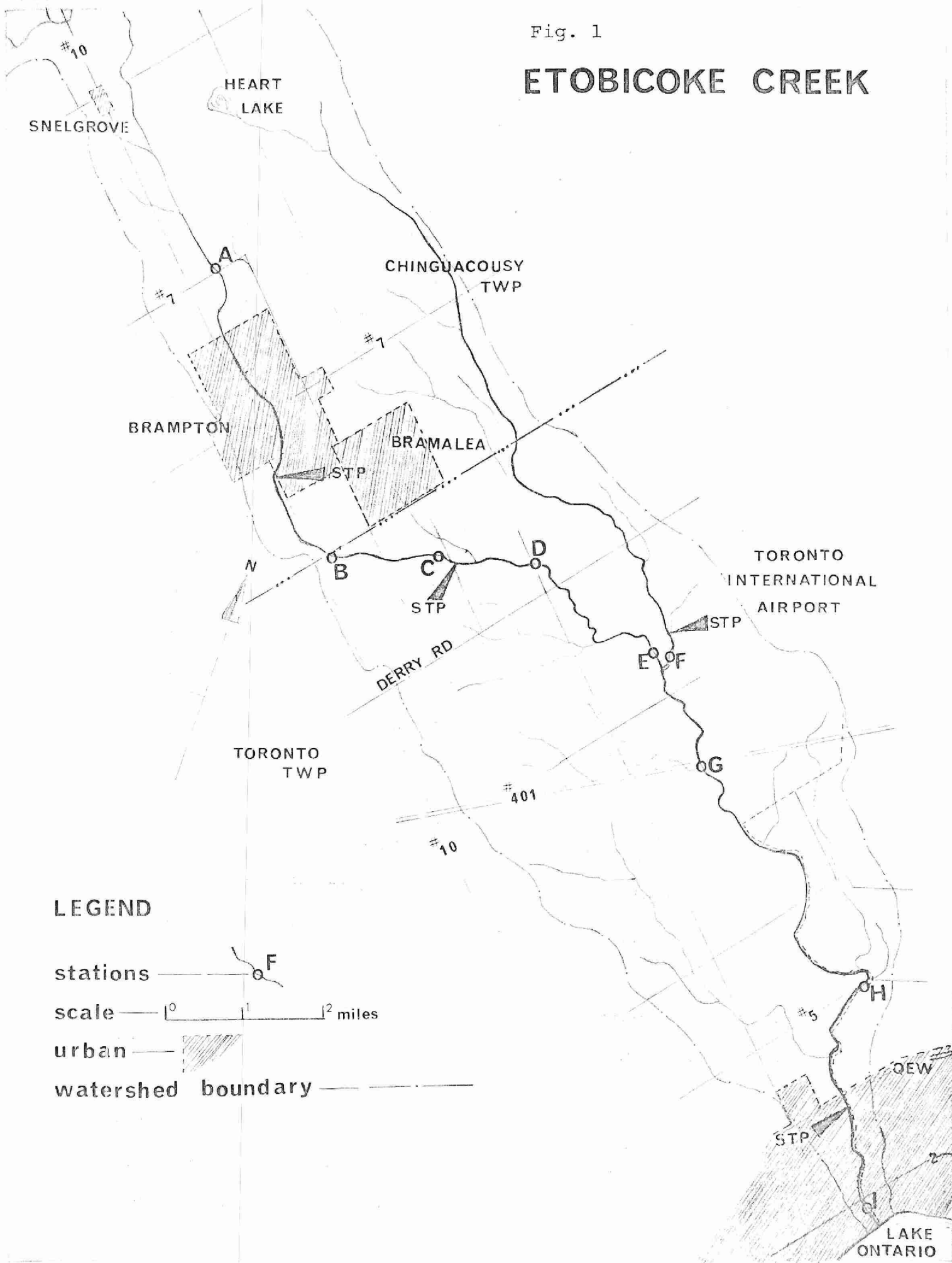
For these reasons, biological surveys were undertaken on the Etobicoke Creek in 1962, 1963 and 1964.

DESCRIPTION OF ETOBICOKE CREEK

The main branch of Etobicoke Creek originates north of Snelgrove in Chingacousy Township at an elevation of 950 feet and flows approximately 35 miles in a south-easterly direction through the municipalities of Brampton, Toronto Township and Long Branch where it empties into Lake Ontario at a general elevation of 245 feet (Figure 1). The main branch receives a number of tributary streams, the largest being the east branch which originates at Heart Lake and flows southeast through Bramalea to its confluence with

Fig. 1

ETOBICOKE CREEK



the main stream in Toronto Township. The total area of the watershed is approximately 30 square miles.

The stream at Stations A, B and C at the time of the summer and fall surveys was from 10 to 20 feet wide and from 6 inches to 2 feet deep increasing in size to approximately 30 feet wide and from 6 to 18 inches deep at Station I. The rapid discharge of melt-water and storm water which is characteristic for the watershed results in wide fluctuations in streamflow. At Station H, the mean monthly flow varies from 249 cubic feet per second in April to only 4 cubic feet per second in August. The mean minimum monthly flow during the summer period is one cubic foot per second and at times no flow exists. Streamflow at this station is estimated to be three or four times greater than at Station A.

The majority of the Etobicoke Creek watershed, particularly the upper portion, consists of excellent agricultural land used intensively for mixed farming and dairy farming. A large area of open land east of Etobicoke Creek and north of Highway 401 is occupied by the Toronto International Airport. Most of the valley land is greenbelt. Major areas of urban development on the watershed are Brampton, Bramlea, Etobicoke Township and Toronto Township south of Highway 5.

Treated domestic and industrial wastes are discharged to the Etobicoke Creek at four locations (Figure.1). Wastes from Brampton are treated at two conventional

activated-sludge sewage treatment plants. The old Brampton plant receives a regulated flow of from 0.75 mgd to 1.0 mgd. The secondary effluent is chlorinated and discharged to Etobicoke Creek at the southerly limits of the town. Flows in excess of 1.0 mgd are redirected to the new Brampton-Chingacousy plant which also receives wastes from Bramalea. During the summer of 1963 this plant was enlarged from 1 mgd to 2 mgd and in 1964 was operating at full capacity. The chlorinated effluent from this plant is discharged to Etobicoke Creek at the 2nd line east of Toronto Township. The Dixie sewage treatment plant, located immediately downstream from the Queen Elizabeth Way, treats an average volume of 0.3 mgd. The secondary effluent is passed through a sand filter (from April to December), and is chlorinated before being discharged to the stream. A trickling-filter plant serving the Toronto International Airport discharges an average volume of 0.21 mgd to a small tributary of the east branch. However, the volume of wastes from this source is subject to wide fluctuations and at times excess flows are discharged directly to the stream.

In total, an average flow of treated municipal wastes of approximately 6 cubic feet per second is discharged at a relatively constant rate to Etobicoke Creek. During the summer months very little natural streamflow is available for dilution of these wastes and a large percentage of the flow in downstream areas consists of waste-water.

SURVEY METHODS

Biological surveys of Etobicoke Creek were conducted on three occasions: October 2 and 3, 1962, October 8 and 9, 1963 and during the period from July 27 to August 6 in 1964. Nine stations were selected for examination (Figure 1). Stations B to I exclusive of F were located on the main branch below Brampton. Station A was located as a control on the main branch above Brampton and Station F was situated on the east branch.

Fish and bottom fauna communities were examined at each station. Water samples were returned to the laboratory for analysis of BOD, solids, phosphorus and nitrogen fractions, ABS and coliform densities.

Bottom fauna

During the surveys in 1962 and 1963 qualitative collections were made at each station from all common habitats. Bottom deposits and vegetation were sampled using a Needham scraper and hand sieve. Riffle fauna was collected from stones. In 1964, three quantitative samples were taken at each station - two 9x9 inch Eckman dredge samples from bottom sediments and one Surber square-foot sample from a riffle section.

Organisms were enumerated and in most cases identified to genus.

Fish

Qualitative collections were made by seining in pool and riffle habitats at each station during the three surveys.

BIOLOGICAL ASSESSMENT OF WATER QUALITY

Biological collections obtained during the 1962, 1963 and 1964 surveys are listed in Tables 1 to 6 of the appendix. The following evaluation of water quality is based primarily on data collected during the latter survey.

The variety and abundance of bottom fauna at the nine sampling stations are illustrated in Figure 2. At Station A a well balanced community consisting of 21 genera and low numbers of organisms indicated good water quality. At Station B approximately 1.6 miles downstream from the Old Brampton sewage treatment plant the bottom fauna was restricted to only 11 genera. Large populations of midge larvae at this station, approximately 2000 per square foot, indicated considerable organic enrichment. However, at Station C, located 1.7 miles below Station B, partial recovery was indicated by a substantial decrease in the abundance of midge larvae and the presence of heavy growths of filamentous algae (Mougoetia) and pondweed (Potamogeton). Although the variety of bottom fauna remained restricted, moderately intolerant mayfly nymphs (Callibaetis) and damselfly nymphs (Ischnura) were present.

At Station D, a further reduction in the number of genera to six and high numbers of midge larvae indicated heavy organic pollution and low concentrations of dissolved oxygen. Levels of total phosphorus, nitrogen fractions and ABS were excessively high (Table 1).

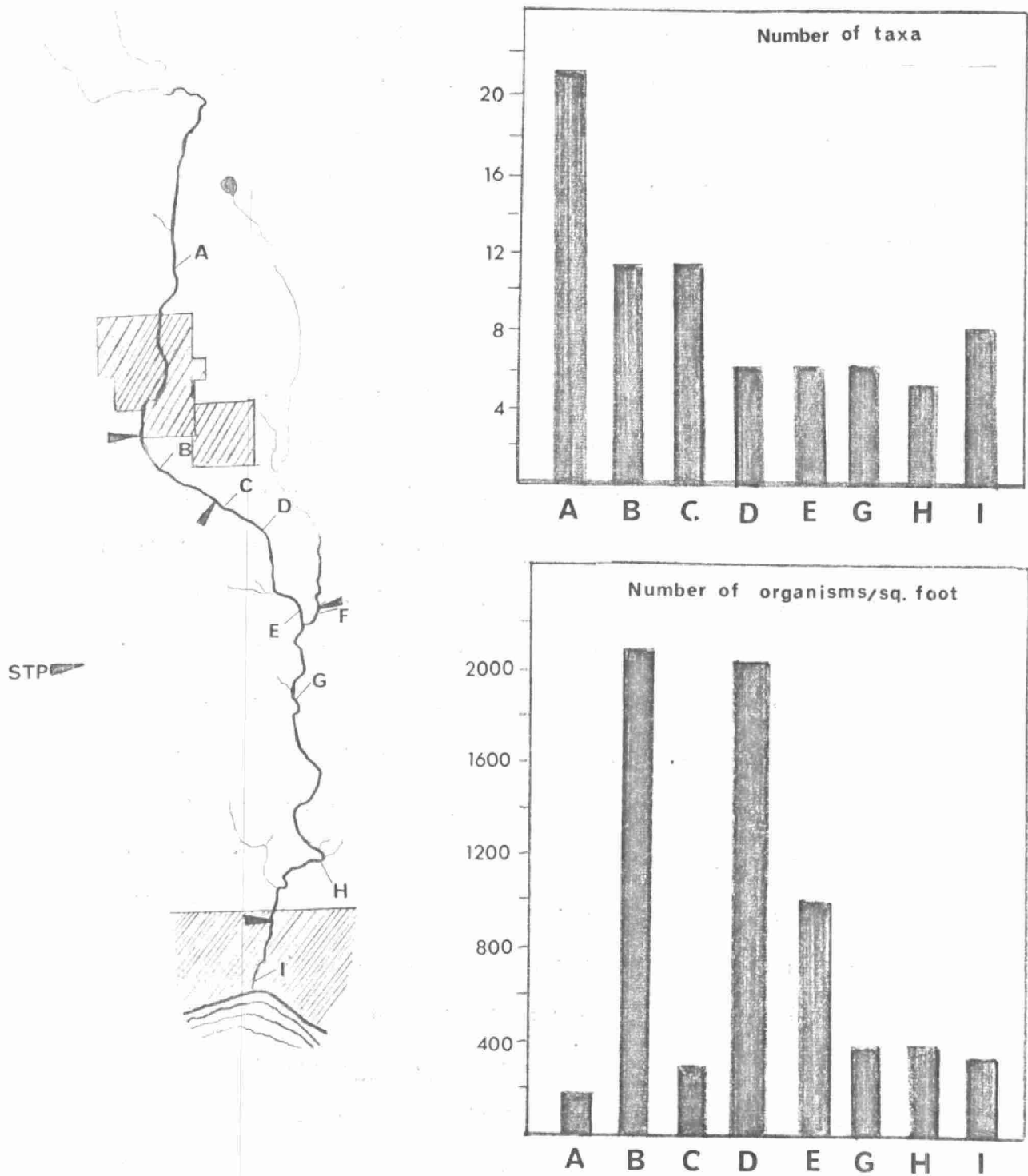


Fig. 2. Number of taxa and number of organisms per square foot collected from the bottom fauna at 8 stations on the main branch of Etobicoke Creek from July 27 to August 6, 1964.

Table 1. Chemical and bacterial determinations made on samples collected at 9 stations on the Etobicoke Creek from July 27 to August 6, 1964.¹

Station	B.O.D.	Solids			Total phosphorus as PO ₄	Free ammonia as N	Total Kjeldahl as N	Coliforms per 100 ml.M.F. (X10)	Anionic detergent as ABS
		Total	Susp.	Diss.					
A	1.8	352	12	340	1.0	0.1	1.3	1.2	0.0
B	31.0	846	10	836	20.0	16.0	25.0	87.6	4.0
C	1.4	786	7	779	22.5	1.0	2.2	0.9	1.6
D	7.4	938	18	920	32.0	22.0	25.0	248.3	4.6
E	13.0	600	5	595	13.4	9.8	6.8	6.4	2.8
F	4.6	370	30	340	2.0	2.0	1.0	60.2	0.1
G	9.8	938	38	900	17.2	0.3	1.7	59.7	3.2
H	4.3	868	82	786	12.4	0.3	1.7	166.0	2.4
I	2.4	704	7	697	7.0	0.3	1.1	87.0	1.1

¹ results expressed as ppm (except coliforms)

The bottom fauna community noted at Station F on the east branch was similar to that at Station D.

Downstream from Station D on the main branch a steady decrease in the abundance of midge larvae and sludge-worms and excessive production of filamentous algae showed a high degree of mineralization of organic wastes and assimilation of inorganic nutrients. This was further substantiated by the significant decrease in concentrations of BOD, solids, phosphorus and nitrogen observed in the lower section of the stream (Table 1). At the same time the variety of bottom fauna throughout this portion of the stream remained restricted and consisted almost entirely of organisms tolerant of low concentrations of dissolved oxygen. This is probably largely attributable to a high respiratory oxygen demand exerted by attached algae during nighttime periods but may be due also to periods of higher concentrations of BOD than those observed during this survey.

The number of species and relative abundance of fish sampled in the Etobicoke Creek adds further to the interpretation of water quality (Figure 3). Collections made at Station A indicated a large population of fish including a variety of species. No fish were taken at Stations B, C, D or G. However, small populations comprised of two relatively tolerant species, the creek chub and white sucker, occurred at Stations E and F. Four species were present at Station H and two were taken at Station I. During previous surveys, fish were present only at Stations H and I

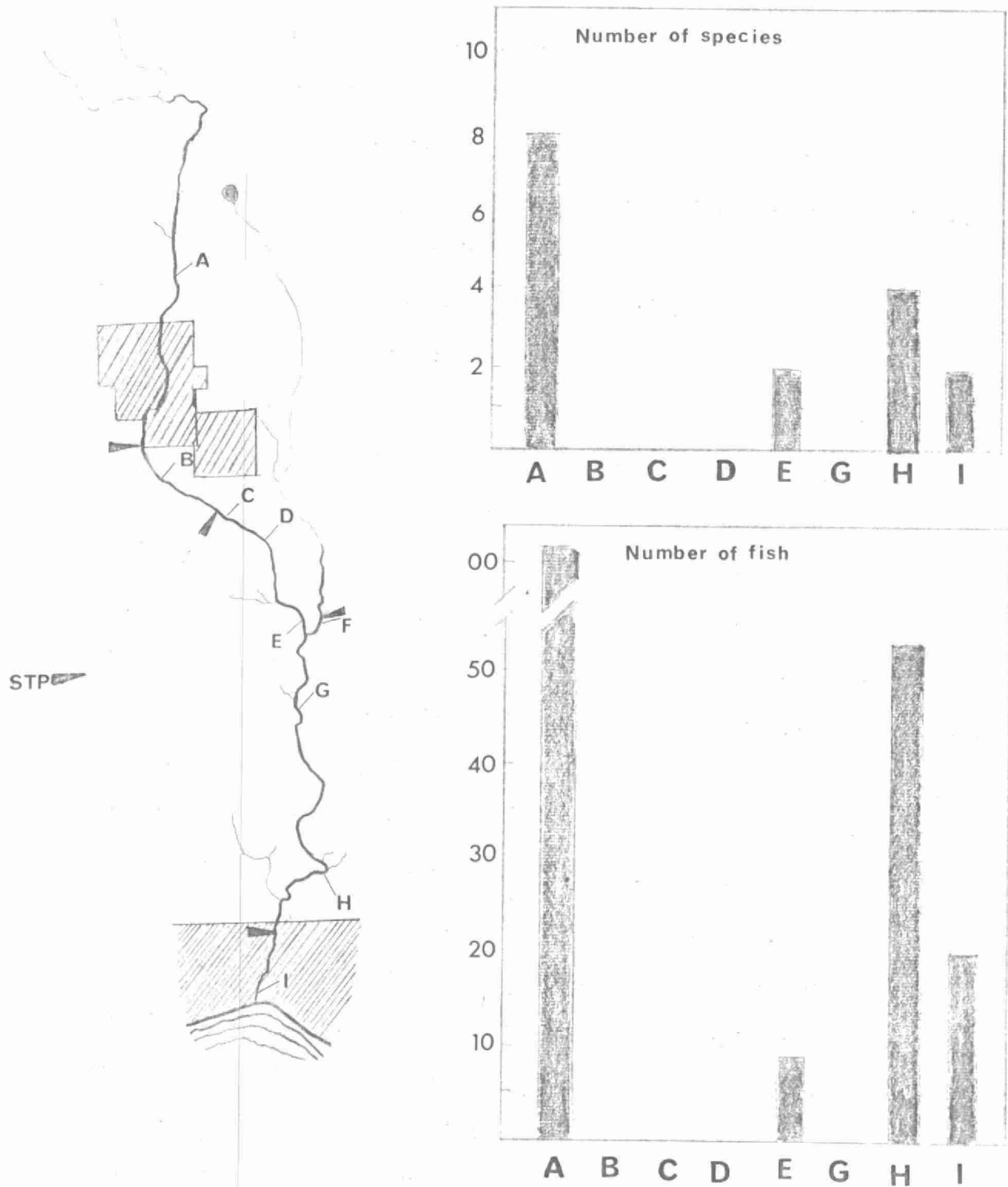


Fig. 3. Number of species and relative abundance of fish at 8 stations on the main branch of Etobicoke Creek, July 27 to August 6, 1964.

below Brampton. This in addition to the bottom fauna communities observed at Stations E and F would indicate that fish populations at these two stations are only transitory.

SIGNIFICANCE OF BIOLOGICAL RESULTS

An examination of bottom fauna communities and fish populations showed impaired water quality in the main branch of Etobicoke Creek below Brampton. Gross organic pollution below waste discharges from Brampton, Bramalea and the International Airport was followed by some improvement downstream as the assimilation of organic materials occurred. Also, the adverse effects of high nutrient concentrations in promoting excessive production of filamentous algae and resultant oxygen depletion was apparent.

Plans for flood control outlined by the Metropolitan Toronto and Region Conservation Authority (1959) include the acquisition of most of the flood plain adjacent to the Etobicoke Creek for development as parklands. However, dense growths of unsightly filamentous algae and obnoxious decomposition odours in the stream below Brampton will seriously limit the maximum use of these lands for recreational activities.

The rapid westerly expansion of Metropolitan Toronto will result in intensive urban development on the watershed in the near future. It has been estimated that the combined population of Brampton and Bramalea, presently about 30,000, will triple by 1980 (Metropolitan Toronto Planning Board, 1965).

It is apparent, therefore, that water of sufficient quality to support the proposed recreational use of valley lands will require either an additional stage of waste treatment with particular emphasis on nutrient removal or the transport of wastes for treatment and direct discharge to Lake Ontario.

REFERENCES

M.T.R.C.A., 1959. Plan for flood control and water conservation.

Metro. Toronto Planning Board, 1965. Official plan of the Metropolitan Toronto planning area.

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Surveys in 1962 and 1963 and identification of material collected were carried out by Yvonne Swabey, assisted by J. Wheatley. D. Osmond and E. Hart took part in the 1964 survey.

APPENDIX

Table 1. Specimens of bottom fauna taken in qualitative collections at 9 stations on the Etobicoke Creek in October, 1962. Collecting methods are outlined in the text of the report. Specimens have been placed in the permanent collection of the Biology Branch as items 62B1 to 62B9.

Taxa	Stations								
	A	B	C	D	E	F	G	H	I
MAYFLIES									
<u>Callibaetis</u>			5		6	2	4	2	1
<u>Stenonema</u>	1								
DRAGONFLIES									
<u>Ischnura</u>	2	28	12	2	4	11	10	4	2
<u>Enallagma</u>	3	1				2	6	1	
<u>Basiaeschna</u>	1								
<u>Gomphus</u>	8								
<u>Libellula</u>		1	11						
<u>Anax</u>		3							
FLIES									
<u>Eristalis</u>		1	1	5	1				
<u>Glyptotendipes</u>		60		4	34	3	7		
<u>Anatopynia dyari</u>			1	3		1			
<u>Tendipes riparius</u>			2	76	3	13	2		
<u>Cricopterus fugax</u>			4						12
<u>Simulium</u>								25	
BEETLES									
<u>Tropisternus</u>		5A			3A				
<u>Helophorus</u>	1A								
<u>Gyrinus</u>		1A							
<u>Laccophilus</u>		6A						1A	
<u>Peltodytes</u>		1A						1A	2A
<u>Berosus</u>			1L						
<u>Agabus</u>						5L	1L		
HEMIPTERA									
<u>Belostoma</u>	2	1							
<u>Notonecta</u>								3	
<u>Hesperocorixa</u>		1							
<u>Corixidae</u>	2			1					
<u>Ranatra</u>	1								
AMPHIPODS									
<u>Hyalolella</u>		1	27			1	9	10	2

Table 1. (continued)

Taxa	Stations								
	A	B	C	D	E	F	G	H	I
DECAPODS									
<u>Orconectes</u>	3								
LEECHES									
<u>Glossiphonia</u>	12								2
<u>Macrobdella</u>									
<u>decora</u>			1				1	3	
<u>Placobdella</u>									
<u>rugosa</u>			1						
<u>Helobdella</u>									
<u>stagnalis</u>			6						
MOLLUSCS									
<u>Helisoma</u>	21		13						
<u>Physa</u>			1		3	3		3	12
<u>Goniobasis</u>	1								
<u>Sphaerium</u>	5								
<u>Pisidium</u>	4								
SLUDGEWORMS									
Unidentified						13	1	17	22

A - adults

L - larvae

APPENDIX

Table 2. Specimens of bottom fauna taken in qualitative collections at 9 stations on the Etobicoke Creek in October, 1963. Collecting methods are outlined in the text of the report. Specimens have been placed in the permanent collection of the Biology Branch as items 63B1 to 63B9.

Taxa	Stations								
	A	B	C	D	E	F	G	H	I
MAYFLIES									
<u>Callibaetis</u>			6		10	3	4	2	
<u>Stenonema</u>	1								
CADDISFLIES									
<u>Rhyacophila</u>	1								
DRAGONFLIES									
<u>Ischnura</u>	14	12	6	1	10	17	24	6	4
<u>Enallagma</u>			2				4	5	
<u>Anax</u>		1					2		
<u>Libellula</u>			1				1	1	
FLIES									
<u>Glyptotendipes</u>		40	32	3	30	4	24		2
<u>Anatopynia</u>			2			10	20	3	
<u>Tendipes riparius</u>						3	2	5	32
<u>Polypedilum</u>	1								
<u>Tendipedidae</u>	1								1
<u>Eristalis</u>		1							
<u>Culex</u>		2							
BEE TL ES									
<u>Peltodytes</u>	1A		2A				1A		
<u>Laccophilus</u>		1A		1A, 1L			3A	13A	
<u>Hydrochus</u>		2L							
<u>Haliphus</u>			3A					1A, 1L	
<u>Hydrobius</u>			1A						
<u>Hygrotus</u>			2A	1A					2A
<u>Dineutus</u>							1L		
<u>Gyrinus</u>							1		
<u>Barosus</u>							1L		
<u>Unidentified</u>							1		
HEMIPTERA									
<u>Hesperocorixa</u>	13		5			4	6		
<u>Corixidae</u>								1	1
AMPHIPODS									
<u>Hyallela</u>	2						11	11	
DECAPODS									
<u>Orconectes</u>	6								

Table 2 - continued

Taxa	Stations								
	A	B	C	D	E	F	G	H	I
LEECHES									
<u>Helobdella</u>									
<u>stagnalis</u>	1		8				1		1
<u>Macrobdella</u>									
<u>decora</u>								9	
MOLLUSCS									
<u>Helisoma</u>	6								
<u>Physa</u>			2		1	14	8	9	5
<u>Limnaea</u>									4
<u>Goniobasis</u>	6								
<u>Pisidium</u>	4								
SLUDGEWORMS									
Unidentified							x	24	x

P - Pupae

L - Larvae

A - Adults

x - present but not enumerated

Table 3. Quantitative collections of bottom fauna at 9 stations on the Etobicoke Creek in July, 1964. The specimens have been placed in the permanent collection of the Biology Branch as items 64B121 to 64B148.

[illegible]

Table 3. continued

	Stations																										
	A			B			C			D			E			F			G			H			I		
Taxa	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S	E1	E2	S
BEETLES - cont.																											
<u>Enochrus</u>							1L		7L															1L			
<u>Haliphus</u>							1L		1A																		
<u>Dytiscidae</u>										1A																	
<u>Berosus</u>									1L		1L												2L	2L	4L		
<u>Ilybius</u>															1A												
<u>Laccophilus</u>																								3L			
Unidentified			1A																								
BUGS																											
<u>Trichocorixa</u>						1																					
<u>Corixidae</u>						2																					
<u>Ochteridae</u>						3																					
Unidentified						1																					
AMPHIPODS																											
<u>Hyallela</u>			6				8	2	2																		
DECAPODS																											
<u>Astacus</u>			5																								
OSTRACODS																											
Unidentified								4	2																		
LEECHES																											
<u>Helobdella</u>							2	8	4																2		
<u>Placobdella</u>																							1	1			2
MOLLUSCS																											
<u>Helisoma</u>	1	47	5										7				1										
<u>Physa</u>			3						18																4		2
<u>Goniobasis</u>	3		64																								
<u>Pisidium</u>	1																										
Unidentified																											5
SLUDGEWORMS																											
Unidentified		3					330	36	8	10	25	5	20	45		6	2	46	166	7	350	54	3	275	30	2	

APPENDIX

Table 4 Catches of fish taken by seine net at 9 stations on the Etobicoke Creek, October, 1962.

Species	Stations								
	A	B	C	D	E	F	G	H	I
White sucker	3								
Bluntnose minnow	10							3	1
Fathead minnow	12							45	
Blacknose dace	1								
Brook stickleback								8	
White bass									1
Rock bass	4								
Johnny darter	2								
Rainbow darter	1								
Total species	7							3	2
Total fish	33							56	2

APPENDIX

Table 6. Catches of fish taken by seine net at 9 stations on the Etobicoke Creek, July, 1964.

Species	A	B	C	D	E	F	G	H	I
White sucker					1	1		46	3
Creek chub	24				8	6		4	12
Common shiner	85								
Fathead minnow								2	
Bluntnose minnow	7								
Blacknose dace	8								
Longnose dace								1	
Brook stickleback						1			
Rock bass	6								
Johnny darter	52								
Rainbow darter	19								
Barred fantail	2								
Total species	8				2	3		4	2
Total fish	203				9	8		53	15